

AMENDMENTS TO THE SPECIFICATION

Please replace the first paragraph of the SUMMARY OF THE INVENTION with the following:

62 According to the invention a seat or body support apparatus is provided that comprises more than one expandable chamber, a pressure system, and an exhaust system. The pressure system is connected to each expandable chamber and is configured to provide fluid into the expandable chambers. The exhaust system is connected to each expandable chamber and is configured to produce an outflow of fluid from the expandable chambers. A controller is connected to the pressure and exhaust systems and is configured to control massage sequence and intensity. The controller is configured to control massage sequence by alternately operating the pressure and exhaust systems for selected chambers according to a predetermined massage control index sequence. The controller is configured to control massage intensity by allowing fluid pressure within the selected chambers to increase only until a selected variable target pressure is reached.

According to another aspect of the invention, a massage method is provided that includes providing a seat or body support system that includes more than one expandable chamber and also includes a pressure system and an exhaust system for each expandable chamber. A controller is provided for operating the pressure and exhaust systems according to multiple selectable predetermined massage control index sequences. A massage sequence is selected by selecting one of the massage control index sequences causing the controller to alternately, provide fluid communication between selected ones of the expandable chambers and the pressure system to produce an inflow of a fluid to each of the expandable chambers, and produce an outflow of fluid from each of the previously inflated expandable chambers by operating the exhaust system. Massage intensity is selected by allowing fluid pressure within the selected chambers to increase only until a selected variable target pressure is reached.

Please insert the subtitle "ADVANTAGES AND FEATURES OF THE VARIOUS ASPECTS OF THE INVENTION" immediately following the above two

paragraphs that replace the original first paragraph of the SUMMARY OF THE INVENTION

Please amend the text beginning at page 3 line 1 and ending at page 6, line 1 of the application as follows:

[Specifically, the massage of the present invention includes an inflate; a deflate and possibly an equalization of pressure between two cells (equilibration).

Q3 In the present invention inflate is defined as an increase in volume or pressure of fluid (including but not limited to air) in one of one or more expandable chambers. Such increase in volume or pressure is effected by opening a supply valve and closing a vent valve while energizing the pump(s) to move volumes of fluid either for a time or until a specified pressure is achieved. In most cases, the pump is connected to a manifold or common chamber and a supply valve is connected to each of the expandable chambers to control the flow of fluid the between the common manifold chamber and the other one or more expandable chambers. Deflate in the present invention is defined as decreasing the volume or pressure of fluid (a fluid may include air but is not limited to air as the fluid medium) in one of the expandable chambers. Such deflation is effected, in one configuration, by closing a supply valve to the chamber and opening a vent valve to move volumes of fluid either for a time or until a particular pressure is achieved. Such deflation is effected, in another configuration, by opening the vent valve (controls the flow of fluid from the common chamber to the atmosphere) and the supply valve to the particular chamber (controls the flow of fluid between the common chamber and the other chambers).

Equilibrate is defined in the present invention as an exchange of fluid (including but not limited to air) between two or more of one or more expandable chambers. Such exchange of fluid is effected by closing the vent valve(s) of two or more chambers and opening supply valves to the same two or more chambers for a specified time. The fluid will flow from the higher-pressure chamber(s) to the lower pressure chamber(s) resulting in an equalization of pressure in all of the participating chambers. The resultant pressure will be less than the initial higher pressures and more than the initial lower pressures unless the pressures were equal to start with.

In one controller suitable for use in the present invention, a microcomputer's non-volatile memory is programmed with data representing a desired massage type and level for the expandable chambers or cells. By sequentially activating individual supply valves, a pressure signal from a transducer can be generated for each cell. The pressure signals are received by the microcomputer and can be compared with the predetermined massage level data to generate a control signal which activates the pump or open and close the supply and exhaust valves. Additionally, in accordance with the present invention, expandable chambers forming the contouring elements of the seat back and seat bottom can have their pressure controlled by a timer to control the activation of the pump or opening and closing of the supply and exhaust valves to produce the desired massage affect.]

93 [One purpose of this invention is to provide] The invention provides a fluidly (in some cases pneumatically) controlled support surface for an occupant such as in a seating system or bed having an array of expandable chambers or cells. Each of such expandable chambers is connected to a source of pressurized fluid (air), and arranged in a manner to inflate in response to produce a massage movement that includes a sequence of inflate and deflate at each of the respective cells in accordance with a massage index for concentrating the massage action on an occupant.

[An object of the invention is to provide] The invention also provides a massage method for [a] an occupant support surface wherein one or more of the expandable chambers or cells is connected through an exhaust valve that will be opened in accordance with a control signal to produce a massage movement including a separate deflate at each of the respective cells so as to provide more concentrated massage.

[Furthermore, another object is to provide] According to another aspect of the invention more than one expandable chamber [that will] provide an indexed massage in accordance with user selected massage types and preprogrammed inflation and deflation of individual expandable chambers by inflate and deflate steps including flow to and from each of a series of individual expandable chambers so as to produce a concentrated pulse type massage action.

[A further object is to provide such] According to another aspect or feature of the invention a pulse type massage action is provided by inflating each of the individual expandable chambers in a progression and thereafter deflating each of the individual expandable chambers by reversing the progression.

[One] Another feature of the present invention is to provide [the system of the preceding objects wherein the] a control sequence for the concentrated massage action that is under [a] microcomputer control.

A still further feature is to include the expandable chambers as a seat back and seat bottom support including such occupant massage.

43 Another feature of the present invention is to provide a control system [for such massage] in the supporting surface of [a] an occupant support including a microcomputer that is programmed to operate a manifold/valve system to automatically fill and deflate individual expandable chambers by fluid flow to and from each expandable chamber in a serial fashion so as to so as to provide more concentrated massage.

Still another feature of the present invention is to provide a microcomputer in the aforesaid systems in which the controller is programmed to operate multiple valves and a pump to conduct an initial inflate or inflation of the expandable chambers or cells to a gross pressure level with all of the valves initially open followed by continuous pressure reads and a sequential closure of each pressure zone formed by one or more cells as the pressure therein is compared by operation of the microcomputer to a desired target pressure and to provide a secondary adjustment of the desired target pressure.

Another feature of the present invention is to provide [a] microcomputer control of the preceding [object] feature wherein the sequential control of the fluid volume flow to and from each expandable chamber or cell is either by a pressure pump inflation with open supply valves inflation or by an exhaust valve deflation.

Still another feature of the present invention is to provide a microcomputer in the aforesaid systems that conditions the system to open all the cells to atmosphere when a seat is not occupied and to inflate the seat back to a desired initialization pressure for occupant support.

Q3 Still another feature of the present invention is to provide a microcomputer in the aforesaid systems in which an initial occupant assessment is made and inputted to the microcomputer and [utilized] used to establish a selected massage index in a look-up table for use in a massage control operation of the system.

Page 12, line 29, the phrase "As mentioned in the summary of the invention section of this application" is deleted.

Page 12, line 30, "in" is replaced by --In--.

Please add the following text to the DESCRIPTION OF THE PREFERRED EMBODIMENTS starting at page 18, line 6 following the last paragraph of the original DESCRIPTION:

Q4 As set forth in the claims, a seat or body support apparatus constructed according to the invention is most broadly described as comprising more than one expandable chamber; a pressure system connected to each expandable chamber and configured to provide fluid into the expandable chambers; an exhaust system connected to each expandable chamber and configured to produce an outflow of fluid from the expandable chambers, and a controller connected to the pressure and exhaust systems. The controller is configured to control massage sequence by alternately operating the pressure and exhaust systems for selected chambers according to a predetermined massage control index sequence. The controller is also configured to control massage intensity by allowing fluid pressure within the selected chambers to increase only until a selected variable target pressure is reached.

The pressure system may include a source of pressurized fluid connected by fluid supply paths to respective supply valves positioned to selectively provide fluid communication between each expandable chamber and the source of pressurized fluid. The exhaust system may include exhaust valves connected to each respective chamber and configured to control the fluid flow from the respective chambers. The controller may then be operatively connected to the supply and exhaust valves and configured to inflate selected chambers by opening corresponding ones of the supply valves and to deflate selected chambers by opening corresponding ones of the exhaust valves. The

exhaust valves are distinct from the supply valves and the fluid supply paths to minimize dwell time between inflation and deflation.

The exhaust system may be configured to actively evacuate chambers by drawing fluid from them. To accomplish this, the exhaust system may include an exhaust pump connected to the controller and operable to draw fluid from selected chambers.

24 The controller may be further configured to provide a range of different massage index sequences. The apparatus in this case includes a user actuable switch connected to the controller and configured to select between the different massage index sequences.

In practice, a massage may be provided by first providing a seat or body support system, such as the one described above, that includes more than one expandable chamber, a pressure system, and an exhaust system for each expandable chamber, and a controller for operating the pressure, and exhaust systems according to multiple selectable predetermined massage control index sequences. A massage sequence is then selected by selecting one of the massage control index sequences causing the controller to alternately provide fluid communication between selected ones of the expandable chambers and the pressure system to produce an inflow of a fluid to each of the expandable chambers and produce an outflow of fluid from each of the previously inflated expandable chambers by operating the exhaust system. Massage intensity is selected by allowing fluid pressure within the selected chambers to increase only until a selected variable target pressure is reached.

The step of providing a seat or body support system may include providing a pressure system that includes a source of pressurized fluid and a supply valve connected to the controller for controlling fluid flow from the pressure source to each of the expandable chambers, and providing an exhaust system that includes an exhaust valve connected to the controller for controlling the fluid flow from a previously inflated expandable chamber. The supply and exhaust valves may then be operated to produce individual chamber to chamber inflation followed by chamber to chamber deflation.

The step of providing a seat or body support system may include providing an exhaust system that includes a common exhaust. In this case, operating the exhaust system includes providing fluid communication between the expandable chambers and

the common exhaust; and opening the common exhaust in accordance with the massage index sequence.

94/ The step of providing a seat or body support system may include providing a pressure system that includes a pressure pump and providing an exhaust system that includes an exhaust pump. In this case fluid communication is selectively and alternately provided between each expandable chamber and the pressure pump and the exhaust pump in accordance with the massage index sequence.

A user initiated switch may be provided along with a range of desired massage index sequences in accordance with user selected preferences. The switch is operated to select one of the desired massage index sequences from the range of sequences to produce individual chamber to chamber inflation followed by chamber to chamber deflation.

The step of providing a seat or body support system may include providing expandable chambers in a back and seat support.

The pressure system may be operated for each expandable chamber to equalize the pressure between predetermined ones of the expandable chambers as each of the predetermined ones of the expandable chambers are selectively inflated and deflated.

A pressure sensor, multiple valves and a pump may be provided along with a microcontroller programmed in response to a signal from the pressure sensor to operate the multiple valves and a pump to initially inflate the expandable chambers to a gross pressure level with all of the valves initially opening. The initial opening occurs prior to cyclically connecting each of the expandable chambers to the pressure source in accordance with the selected massage index sequence.

The step of providing a seat or body support system may include providing the expandable chambers as a series of zones. In this case, the step of selecting a massage sequence includes selecting a massage index sequence that first inflates each of the zones in a series fashion then deflates each of the zones in a reverse series fashion.

The step of providing a seat or body support system may also include providing the expandable chambers as a series of zones including a first zone, a second zone and a third zone. In this case, the step of selecting a massage sequence includes selecting a

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massage index sequence that equalizes the pressure in the first and second zones by fluid transfer therebetween, then inflates only the first zone and deflates the second zone while the first zone remains inflated, then equalizes the pressure in the first and second zones, then inflates the second zone, then deflates the first zone while the second zone remains inflated. The pressure is then equalized in the second and third zones by fluid transfer therebetween and then only the third zone is inflated and the second zone is deflated while the third zone remains inflated.

The step of providing a seat or body support system may include providing first and second air cells (O, 1). In this case, the step of selecting a massage sequence includes providing and selecting a massage index sequence that cyclically varies the pressure in the air cells by inflating the first air cell, equalizing pressure between the first and second air cells, deflating the first air cell, reinflating the first air cell, controlling the valved communication to equalize pressure between the first and second air cells following reinflation of the first air cell, and deflating the first air cell.

The step of providing a seat or body support system may include providing first and second air cells (O, 1). In this case, the step of selecting a massage sequence includes providing and selecting a massage index sequence that cyclically varies the pressure in the air cells by inflating the first air cell, equalizing pressure between the first and second air cells, deflating the first air cell, reinflating the first air cell; controlling the valved communication to equalize pressure between the first and second air cells following reinflation of the first air cell; and deflating the first air cell.

The step of providing a seat or body support system may include providing expandable chambers as a series of zones including zone 0; zone 1; zone 2; zone 3; zone 4; zone 5; zone 6; zone 7. In this case, the step of selecting a massage sequence includes providing and selecting a massage index sequence that includes equalizing the pressure in zones 0 and 1 by reducing the pressure in zone 1 and increasing the pressure in zone 0; inflate zone 0; deflate zone 1; equalize the pressure in zones 1 and 0 by fluid transfers from zone 0 to zone 1 reducing the pressure in zone 0 and increasing the pressure in zone 1; inflate zone 1; deflate zone 0; equilibrate zones 2 and 1 (air transfers from zone 1 to zone 2 reducing the pressure in zone 1 and increasing the pressure in zone 2); inflate zone

94 2; deflate zone 1; equilibrate zones 5 and 2 (air transfers from zone 2 to zone 5 reducing the pressure in zone 2 and increasing the pressure in zone 5); inflate zone 5; deflate zone 2; equilibrate zones 6 and 5 (air transfers from zone 5 to zone 6 reducing the pressure in zone 5 and increasing the pressure in zone 6); inflate zone 6; deflate zone 5; equilibrate zones 7 and 6 (air transfers from zone 6 to zone 7 reducing the pressure in zone 6 and increasing the pressure in zone 7); inflate zone 7; deflate zone 6; equilibrate zones 6 and 7 (air transfers from zone 7 to zone 6 reducing the pressure in zone 7 and increasing the pressure in zone 6); inflate zone 6; deflate zone 7; equilibrate zones 5 and 6 (air transfers from zone 6 to zone 5 reducing the pressure in zone 6 and increasing the pressure in zone 5); inflate zone 5; deflate zone 6; equilibrate zones 2 and 5 (air transfers from zone 5 to zone 2 reducing the pressure in zone 5 and increasing the pressure in zone 2); inflate zone 2; deflate zone 5; equilibrate zones 1 and 2 (air transfers from zone 2 to zone 1 reducing the pressure in zone 2 and increasing the pressure in zone 1); inflate zone 1; deflate zone 2; repeat.

The step of providing a seat or body support system may include providing expandable chambers including a series of zones including zone 0; zone 1; zone 2; zone 3; zone 4; zone 5; zone 6; zone 7. In this case the step of selecting a massage sequence includes providing and selecting a massage index sequence including equalizing the pressure in zones 0 and 1 by reducing the pressure in zone 1 and increasing the pressure in zone 0; inflate zone 0; deflate zone 1; equalize the pressure in zones 1 and 0 by fluid transfers from zone 0 to zone 1 reducing the pressure in zone 0 and increasing the pressure in zone 1; inflate zone 1; deflate zone 0; equilibrate zones 2 and 1 (air transfers from zone 1 to zone 2 reducing the pressure in zone 1 and increasing the pressure in zone 2); inflate zone 2; deflate zone 1; equilibrate zones 5 and 2 (air transfers from zone 2 to zone 5 reducing the pressure in zone 2 and increasing the pressure in zone 5); inflate zone 5; deflate zone 2; equilibrate zones 6 and 5 (air transfers from zone 5 to zone 6 reducing the pressure in zone 5 and increasing the pressure in zone 6); inflate zone 6; deflate zone 5; equilibrate zones 7 and 6 (air transfers from zone 6 to zone 7 reducing the pressure in zone 6 and increasing the pressure in zone 7); inflate zone 7; deflate zone 6; equilibrate zones 6 and 7 (air transfers from zone 7 to zone 6 reducing the pressure in zone 7 and

64 increasing the pressure in zone 6); inflate zone 6; deflate zone 7; equilibrate zones 5 and 6 (air transfers from zone 6 to zone 5 reducing the pressure in zone 6 and increasing the pressure in zone 5); inflate zone 5; deflate zone 6; equilibrate zones 2 and 5 (air transfers from zone 5 to zone 2 reducing the pressure in zone 5 and increasing the pressure in zone 2); inflate zone 2; deflate zone 5; equilibrate zones 1 and 2 (air transfers from zone 2 to zone 1 reducing the pressure in zone 2 and increasing the pressure in zone 1); inflate zone 1; deflate zone 2; repeat.

The step of selecting massage intensity may include selecting a massage index sequence that achieves a selected variable target pressure within each selected chamber by scaling inflation time.

The step of providing a seat or body support system may include providing a pressure sensor in fluid communication with each chamber and connected to the controller. In this case, the step of selecting massage intensity includes selecting a massage index sequence that achieves a selected variable target pressure within each selected chamber by increasing fluid pressure in each chamber until the controller receives respective signals from the pressure sensors indicating that their respective target pressures have been reached.

The steps of selecting massage sequence and massage intensity may be accomplished simultaneously by selecting a single massage control index sequence.

The step of providing a seat or body support system may include providing an exhaust system configured to actively evacuate chambers by drawing fluid from them.

The step of providing a seat or body support system may include providing an exhaust system that includes an exhaust pump. In this case, operating the exhaust system includes providing fluid communication between selected chambers to be deflated and the exhaust pump and operating the pump to evacuate the selected chambers.

This is an illustrative description of invention embodiments using descriptive rather than limiting words. Many modifications and variations are possible within the scope of the claims and one may practice the invention other than as described.
